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NOISE ANALYSIS FOR LOCKHEED RESIDENTIAL DEVELOPMENT

CITY OF MILPITAS

Report # 03-077
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Prepared for:

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SUMMARY
NOISE ANALYSIS FOR LOCKHEED RESIDENTIAL DEVELOPMENT

CITY OF MILPITAS

EXTERIOR NOISE MITIGATION

For the exterior living areas that are exposed to worst case combined roadway and train noise levels greater than 65 LDN, some form of noise mitigation is required. An effective method of reducing the combined noise to acceptable levels is with a noise barrier.

Exterior living areas are generally defined as spaces that are associated with residential land uses typically used for passive recreational activities or other noise-sensitive uses. For example, rear yard areas, patio areas, and balconies. According to the site plan and architectural drawings, the units along Curtis Avenue (Buildings – 28 through 31, 34 through 38, 1 through 3, and 7 through 10, of Plan type A and B) as well as units along the Union Pacific Rail Road (UPRR) line at the east end of the project contain patios. However, these patios are not privately accessed from inside the unit. These patio areas would not be considered an outdoor private living space. Additionally, noise barrier encompassing these patios would deny access to the patio itself. In addition, there are no second floor balconies planned for these units. Therefore, exterior mitigation of these particular units is not required.

The units along the UPRR line at the west end of the project and Main Street (Building 27 of Plan type C) do contain second and third floor balconies that are accessed from inside the unit itself, thus requiring analysis. Representative cross-sections along the UPRR line west and Main Street (see Appendix A for analysis data) were analyzed to determine the necessary noise barrier locations and heights. Exterior living areas will be exposed to worst case noise levels of 65.6 LDN. Therefore, in order to meet the 65 LDN exterior noise standard, a noise barrier will be required for Building 27. The required noise barrier locations and heights are listed in Table S1, and are shown in Exhibit S1.

TABLE S1
REQUIRED NOISE BARRIER LOCATIONS AND HEIGHTS

Building	Required Barrier Height	Floor
27	5.5	2, 3

The required barrier height is relative to the patio or balcony floor elevation. The noise barriers must have a surface density of at least 3.5 pounds per square foot, and shall have no openings or gaps. The barrier may be constructed of 3/8 inch plate glass, 5/8 inch plexiglass, stud and stucco construction, or a combination of these materials. The floors for the decks must be solid; slat floors are not acceptable.

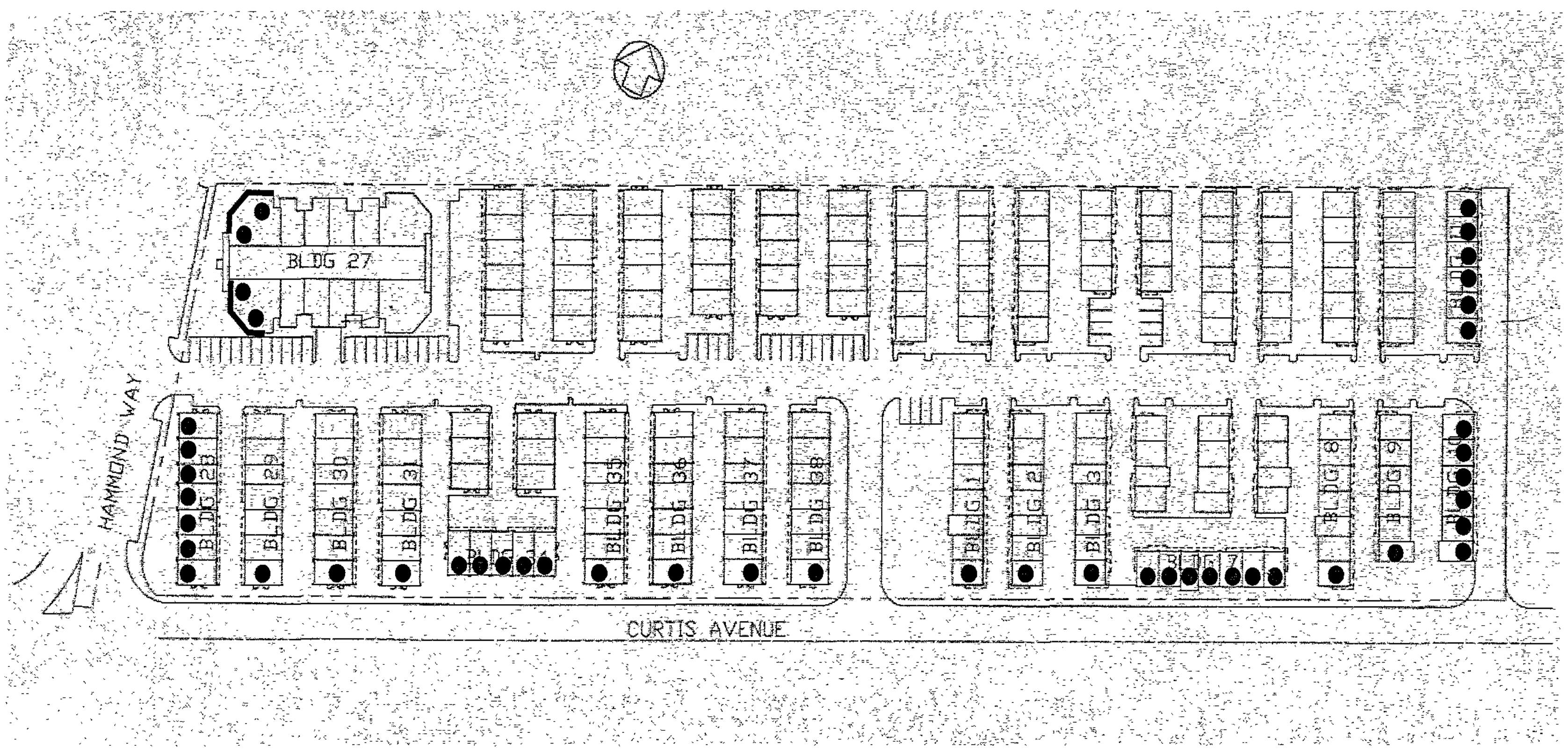
INTERIOR NOISE MITIGATION

Detailed engineering calculations that demonstrate the noise reduction levels are necessary for residential building attenuation requirements greater than 20 dB. Building surfaces will be exposed to worst case noise levels of 66.2 LDN. In order to meet the 45 LDN interior standard, a noise reduction of at least 21.2 dB will be required. It must be noted that with construction practices common in California, residential buildings achieve outdoor to indoor noise reductions of at least 20 dB. Based on our experience, buildings of this type planned for the project achieve a noise reduction beyond 21.2 dB. Regardless, a detailed indoor noise analysis will be required to determine the building upgrades for the homes exposed to noise levels greater than 65 LDN when detailed architectural plans become available, and prior to issuance of a building permit.

Adequate Ventilation Requirements

With windows open, the outdoor to indoor noise reduction of a building falls to about 12 dB. Therefore, for those homes experiencing a combined noise level greater than 57 LDN, windows must remain closed to meet the indoor noise standard. In order to assume that windows can remain closed to achieve this required attenuation, adequate ventilation with windows closed must be provided per the Uniform Building Code (1998 California Building Code, Section 1203.3). This can be achieved with mechanical ventilation to provide fresh air. The fresh air inlet duct shall be of sound attenuating construction and shall consist of a minimum of ten feet of straight or curved duct, or six feet plus one sharp 90 degree bend. Air conditioning units may be an adequate substitute for mechanical ventilation as long as they meet the ventilation requirements specified in the Uniform Building Code. The acceptability of using air conditioners to meet the mechanical ventilation requirement varies by municipality. The local jurisdiction and the mechanical engineer for the project should be consulted.

All units along Curtis Avenue (at Buildings 28 through 31, 34 through 38, 1 through 3, and 7 through 10) and units along the UPRR line (at Buildings 27 and 28) experience noise levels greater than 57 LDN, and will need to have windows closed to meet the 45 LDN standard. These units will need to be provided with adequate ventilation (e.g., a mechanical ventilation system). These units are shown in Exhibit S1.



units requiring mechanical ventilation

required 5.5' balcony noise barrier

Exhibit S1
Required Mitigation to Meet 45 LDN and 65 LDN Noise Standards

NOISE ANALYSIS FOR LOCKHEED RESIDENTIAL DEVELOPMENT

CITY OF MILPITAS

1.0 INTRODUCTION

The purpose of this report is to assess compliance of the Lockheed Residential Development with the noise related conditions of approval placed on the project by the City of Milpitas. The project calls for the development of single family residences. This report addresses the future noise levels at the project site in relation to the 65 LDN exterior and 45 LDN interior noise standards adopted by the City of Milpitas.

The project site is located in the City of Milpitas as shown in Exhibit 1. The site is in proximity to two railroad lines, a rail yard, and several local roadways. The west side of the project is adjacent to Hammond Way, the Union Pacific Railroad, and Main Street. Curtis Avenue is the southern border of the project. The Union Pacific Railroad and rail yard is along the east edge of the project site.

2.0 CITY OF MILPITAS NOISE STANDARDS

The City of Milpitas specifies outdoor and indoor noise limits for residential land uses. Both standards are based upon the LDN index. LDN (Day-Night Noise Level) is a 24-hour time weighted annual average noise level based on the A-weighted decibel. A-weighting is a frequency correction that correlates overall sound pressure levels with the frequency response of the human ear. Time weighting refers to the fact that noise that occurs during certain noise-sensitive time periods is given more significance because it occurs at these times. In the calculation of LDN, noise occurring during the nighttime period (10 p.m. to 7 a.m.) is weighted by 10 dB. This time period and weighting factor is used to reflect increased sensitivity to noise while sleeping, eating, and relaxing.

The City of Milpitas has adopted an exterior noise standard of 65 LDN for a five-foot-tall observer located at least five feet within the property line. In addition, the City enforces the State of California interior noise standard of 45 LDN. This analysis assesses the noise levels within the project with respect to these criteria.

3.0 METHODOLOGY

The traffic noise levels projected in this report were computed using the Highway Noise Model published by the Federal Highway Administration ("FHWA Highway Traffic Noise Prediction Model", FHWA-RD-77-108, December 1978). The FHWA Model uses traffic volume, vehicle mix, vehicle speed, and roadway geometry to compute the "equivalent noise level". A computer code computes equivalent noise levels for each of the time periods used in LDN. Weighting and summing these noise levels results in the LDN for the traffic projections used.

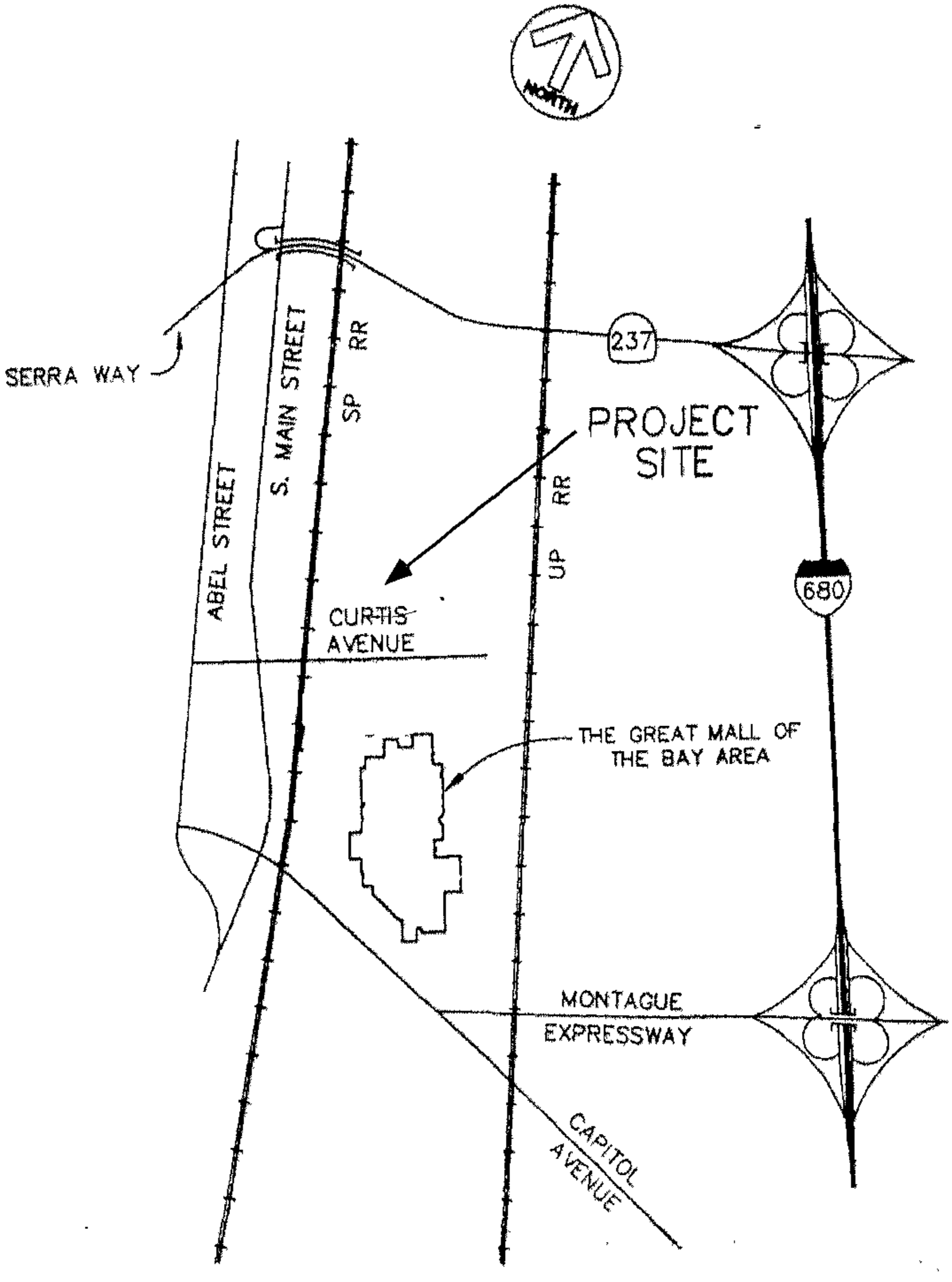


EXHIBIT 1

Vicinity Map and Site Location

Mestre Greve Associates

4.0 NOISE EXPOSURE

4.1 Roadway Noise Exposure

Traffic information for Main Street, Curtis Avenue, and Hammond way was obtained from the traffic engineer for the project (Brett Walinski, Hexagon Transportation Consultants March 2003). Hammond way is not considered a roadway of significant traffic volume. The traffic engineer projected future peak hour traffic levels for Main Street and Curtis Avenue. Typically, the peak hour traffic will be 8 to 10% of the average daily traffic. An 8% value was used to calculate the average daily traffic (ADT) needed for forecasting traffic noise levels. The traffic distribution used in the calculations is presented in Table 1. The traffic volumes used for the noise analysis are presented below in Table 2.

TABLE 1
Traffic Volumes, Speeds and Roadway Grades

Roadway	ADT	Speed	Grade
Main Street	22,000	50	< 3%
Curtis Avenue	6,200	40	< 3%

TABLE 2
Traffic Distribution per Time of Day in Percent of ADT

Vehicle Type	Day	Evening	Night
Main Street			
Automobile	73.69	11.34	9.45
Medium Truck	2.15	0.33	0.28
Heavy Truck	2.15	0.33	0.28
Curtis Avenue			
Automobile	62.72	15.90	9.72
Medium Truck	7.58	1.92	1.17
Heavy Truck	0.69	0.18	0.11

4.2 Railroad Noise Exposure

Two railroads are in proximity to the project site. On the eastern border of the site is a railroad owned by Union Pacific Railroad. This railroad, once owned by Western Pacific Railroad, is a spur line that terminates approximately 6 miles south of the project site in San Jose near the State University. In the vicinity of the project site the railroad consists of two tracks, with one of the tracks used as a passing track. Just east of the project site the railroad joins with a switching yard complex.

A second railroad is adjacent to the western edge of the project site. It is referred to as the Southern Pacific Railroad line. However, Union Pacific purchased Southern Pacific recently so the line is actually owned by Union Pacific Railroad. This line was a trunk line for Southern Pacific Railroad and was used by freight trains. However, another railroad is located west of Interstate 880 and now is used by these freight trains. Currently very few train operations are occurring on this railroad.

4.2.1 On-Site Railroad Noise Measurements / Exposure (East End of Project Site)

Noise measurements of train events on the east end of the project site (railroad joins with a switching yard complex) were made at from September 24 to September 25 1998 and from October 1 to October 2 1998. The two 24 hour noise measurements were performed at the same location (designated as Site A). These measurements were made with a Bruel & Kjaer Type 4427 Sound Level Meter. The system was calibrated before and after each measurement series. The noise measurement system meets the American National Standards Institute "Type 1" specifications, which is the most accurate for community noise measurements. Both the meter and calibrator had current certification traceable to the National Bureau Of Standards. The measurement results are presented in Table 3.

TABLE 3
24 Hour Noise Measurement Results (dBA)

Date	Start Time	End Time	Leq	Lmax	Lmin
SITE A					
Sept. 24	10:00 a.m.	11:00 a.m.	58.4	77.5	45.9
	11:00 a.m.	12:00 p.m.	56.7	71.5	38.1
	12:00 p.m.	1:00 p.m.	60.9	81.7	32.1
	1:00 p.m.	2:00 p.m.	58.4	77.1	30.9
	2:00 p.m.	3:00 p.m.	57.8	77.9	37.3
	3:00 p.m.	4:00 p.m.	58.0	73.7	39.3
	4:00 p.m.	5:00 p.m.	58.7	76.7	36.7
	5:00 p.m.	6:00 p.m.	60.0	75.1	39.3
	6:00 p.m.	7:00 p.m.	59.5	76.3	34.1
	7:00 p.m.	8:00 p.m.	60.9	81.9	43.3
	8:00 p.m.	9:00 p.m.	56.6	70.5	33.9
	9:00 p.m.	10:00 p.m.	56.5	76.3	33.5
	10:00 p.m.	11:00 p.m.	55.5	70.7	35.7
	11:00 p.m.	12:00 a.m.	57.1	75.1	33.9
Sept. 25	12:00 a.m.	1:00 a.m.	52.1	66.5	31.7
	1:00 a.m.	2:00 a.m.	49.4	63.7	29.3
	2:00 a.m.	3:00 a.m.	47.2	60.5	34.3
	3:00 a.m.	4:00 a.m.	49.2	66.5	26.9
	4:00 a.m.	5:00 a.m.	49.0	67.5	27.1
	5:00 a.m.	6:00 a.m.	52.5	68.1	29.7
	6:00 a.m.	7:00 a.m.	56.3	75.3	32.1
	7:00 a.m.	8:00 a.m.	57.0	74.3	43.5
	8:00 a.m.	9:00 a.m.	57.3	74.7	30.9
	9:00 a.m	10:00 a.m.	55.8	71.7	35.9

TABLE 3 (continued)
24 Hour Noise Measurement Results (dBA)

Date	Start Time	End Time	Leq	Lmax	Lmin
SITE A					
Oct. 1	1:00 p.m.	2:00 p.m.	57.9	76.2	31.2
	2:00 p.m.	3:00 p.m.	58.2	78.5	31.6
	3:00 p.m.	4:00 p.m.	59.3	75.4	40.0
	4:00 p.m.	5:00 p.m.	58.6	76.9	36.8
	5:00 p.m.	6:00 p.m.	59.9	74.4	40.4
	6:00 p.m.	7:00 p.m.	60.1	77.0	34.5
	7:00 p.m.	8:00 p.m.	56.4	70.7	33.9
	8:00 a.m.	9:00 a.m.	57.2	70.6	33.8
	9:00 p.m.	10:00 p.m.	57.4	77.0	34.1
	10:00 p.m.	11:00 p.m.	56.7	71.4	35.3
	11:00 p.m.	12:00 a.m.	56.4	74.2	33.3
Oct. 2	12:00 a.m.	1:00 a.m.	53.0	65.1	32.0
	1:00 a.m.	2:00 a.m.	48.3	65.5	30.5
	2:00 a.m.	3:00 a.m.	48.5	62.3	33.2
	3:00 a.m.	4:00 a.m.	49.2	63.3	27.4
	4:00 a.m.	5:00 a.m.	47.9	64.0	27.6
	5:00 a.m.	6:00 a.m.	53.1	67.3	30.0
	6:00 a.m.	7:00 a.m.	56.5	70.5	32.3
	7:00 a.m.	8:00 a.m.	56.8	73.6	43.3
	8:00 a.m.	9:00 a.m.	56.8	73.9	33.0
	9:00 a.m.	10:00 a.m.	57.4	72.2	35.7
	10:00 a.m.	11:00 a.m.	58.1	70.7	36.2
	11:00 a.m.	12:00 p.m.	57.6	72.4	35.7
	12:00 p.m.	1:00 p.m.	58.8	77.4	35.4

All noise measurements at Site A had Leq values less than 65 dBA. These noise levels were caused primarily by operations at the railroad switching yard located approximately 500 feet east of the project site. The switching yard, although audible, does not result in high noise levels at the site. The maximum sound levels that occurred at Site A (in the range of 70 to 80 dBA) were due to aircraft flyovers.

Operations at the east edge of the site can be between 5 and 15 operations per day. The speeds are low on this line, and are in the 10 to 20 mile per hour range. Most of the trains are short with 10 to 12 cars being the maximum. The operations occur randomly throughout a 24 hour day. The results of the data for the two 24 hour measurements indicate that the majority of the 1 hour Leq levels are below 65 dBA at the east portion of the project (Site A). <u>The Ldn noise level from the Leq data was calculated at 61.0 LDN at the east end of the project site.</u>

4.2.2 Modeled Train Noise Exposure (West End of Project Site)

The Union Pacific railroad (UPRR) line runs along the west end of the project site. The "Assessment of Noise Environments Around Railroad Operations," (Wyle Laboratories Report WCR-73-5, July 1973) was used to model the train noise levels on the west end of the project site. The noise generated by a train pass-by can be divided into two components; that generated by the engine or locomotive, and that due to the railroad cars. The characteristic frequency of the engine is different than that for the cars. The effective radiating frequency is 1000 Hz for the locomotive engines, and 2000 Hz for the portion of the noise generated by the cars. The noise generated by the engine is the result of the mechanical movements of the engine parts, the combustion process, the horn if used, and to a lesser extent the exhaust system. The noise generated by the cars is a result of the interaction between the wheels and the railroad tracks. A zero source height is used for the car noise, and a source height of 10 feet above the track is utilized for the locomotive. The train noise levels are calculated by summing the noise generated by the locomotive and the noise generated by the cars.

Numerous phone calls were made to Union Pacific Railroad to obtain information on train operations for these two lines. Union Pacific Railroad does not have a central location where one can obtain information about existing and future operations. For the purpose of our train noise prediction analysis (worst case scenario), the estimated number of operations occurring during the day was assumed to be 3. The number of operations occurring at night was assumed to be 1.

4.3 Modeled Noise Exposure LDN Contours

The FHWA model and Wyle model used these assumptions to compute the future noise levels at the project site. Table 4 reports the modeling results in terms of distances to the 60, 65, and 70 LDN contours. These represent the distances from the centerline of the roadway / railroad to the contour value shown. Note that the values given in Table 4 do not take into account the effect of intervening topography that may affect the noise exposure. Topographic effects are included in a subsequent section of this report. In addition, these projections do not include any future vehicle noise reduction assumptions to take into account the effects of legislation requiring quieter vehicles in the future.

TABLE 4
Distance to Noise Contours for Future Traffic Conditions

Noise Source	Distance to LDN Contour (ft.) -70-	-65-	-60-
Main Street	71	154	332
Curtis Avenue	25	54	116
Union Pacific Railroad (west end)	41	145	270

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Exterior living areas are generally defined as spaces that are associated with residential land uses typically used for passive recreational activities or other noise-sensitive uses. For example, rear yard areas, patio areas, and balconies. According to the site plan and architectural drawings, the units along Curtis Avenue (Buildings – 28 through 31, 34 through 38, 1 through 3, and 7 through 10, of Plan type A and B) as well as units along the Union Pacific Rail Road (UPRR) line at the east end of the project contain patios. However, these patios are not privately accessed from inside the unit. A noise barrier encompassing these patios would deny access to the patio itself. In addition, there are no second floor balconies planned for these units. Therefore, exterior mitigation of these particular units is not feasible.

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TABLE 5
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Building	Required Barrier Height	Floor
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With windows open, the outdoor to indoor noise reduction of a building falls to about 12 dB. Therefore, for those homes experiencing a combined noise level greater than 57 LDN, windows must remain closed to meet the indoor noise standard. In order to assume that windows can remain closed to achieve this required attenuation, adequate ventilation with windows closed must be provided per the Uniform Building Code (1998 California Building Code, Section 1203.3). This can be achieved with mechanical ventilation to provide fresh air. The fresh air inlet duct shall be of sound attenuating construction and shall consist of a minimum of ten feet of straight or curved duct, or six feet plus one sharp 90 degree bend. Air conditioning units may be an adequate substitute for mechanical ventilation as long as they meet the ventilation requirements specified in the Uniform Building Code. The acceptability of using air conditioners to meet the mechanical ventilation requirement varies by municipality. The local jurisdiction and the mechanical engineer for the project should be consulted.

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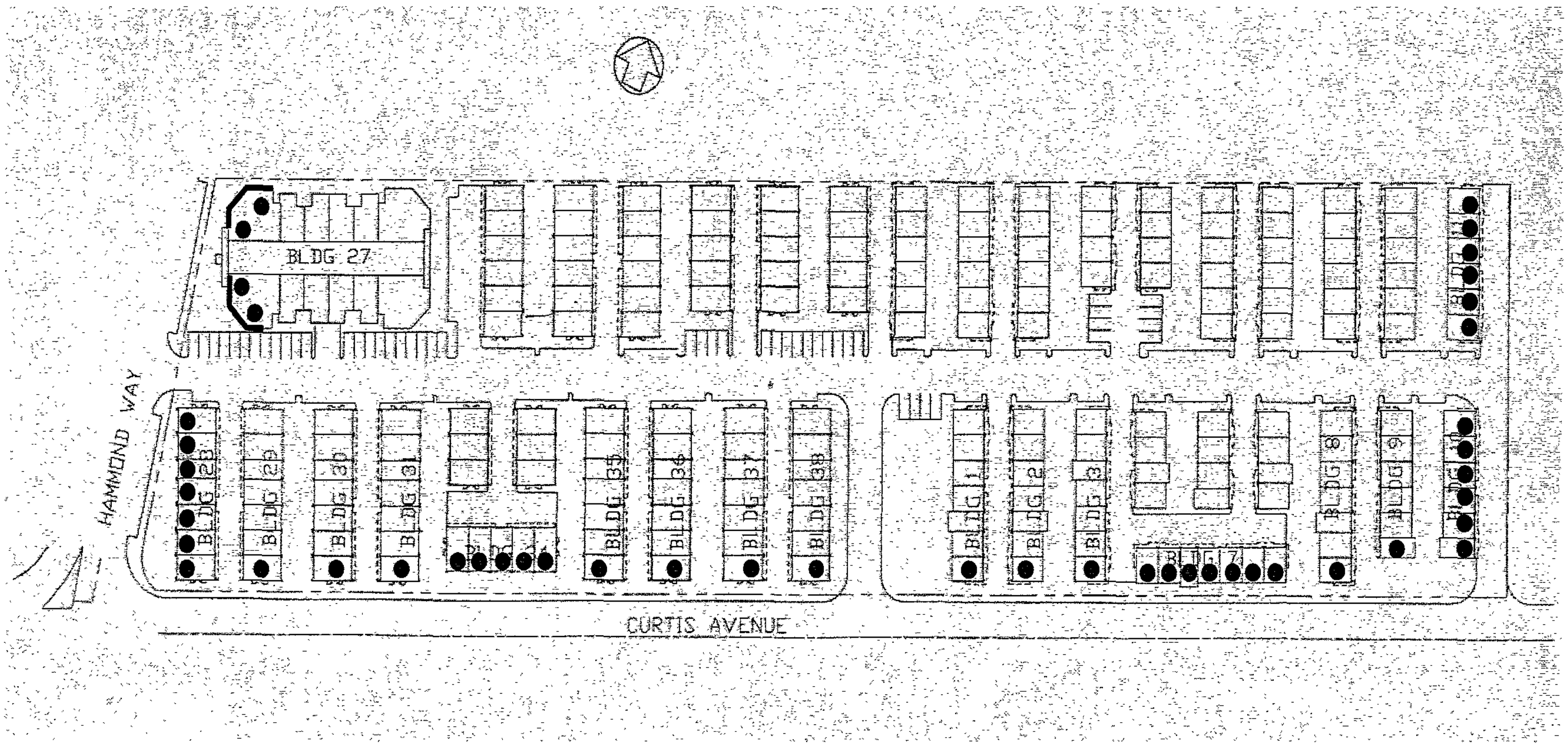

● units requiring mechanical ventilation

required 5.5' balcony noise barrier

Exhibit 2
Required Mitigation to Meet 45 LDN and 65 LDN Noise Standards

APPENDIX A

DATA USED TO DETERMINE NOISE EXPOSURE

Future 2022
MacTrainBarrier
Tract 16042

With Noise Adjustment

	0	**1.5**	**0**	**0**		
Train Type		*Local Freight*	*Metro Link*	*Coaster*		Total Ops
# of Cars	*0*	*50*	*0*	*0*		
Speed	*0*	*50*	*0*	*0*		
# Day	*0*	*3*	*0*	*0*		3 (7 am - 7 pm)
# Evening	*0*	*0*	*0*	*0*		0 (7 pm - 10 pm)
# Night	*0*	*1*	*0*	*0*	**TOTAL**	1 (10 pm - 7 am)
Car SEL @ 100'	0.0	102.3	0.0	0.0	**102.3**	4
Engine SEL @ 100'	0.0	101.0	0.0	0.0	**101.0**	
Enter Distance To Get CNEL Level						
100	0.0	66.5	0.0	0.0	66.5	
145	0.0	65.0	0.0	0.0	65.0	
680	0.0	52.5	0.0	0.0	52.5	
570	0.0	53.9	0.0	0.0	53.9	

Total	**4**
Day	3
Evening	0
Night	1

where N=±x(A+B-d) 1430
or x=2/Wavelength 1280
150

	f	x
Engine :	250	0.442477876
	500	0.884955752

Lot	Rail Elevation	Distance To Wall	Base Of Wall	Dist. To Obsrvr /Bldg	Pad /Floor Elevation	Observer Height	Wall Height	*Barrier Reduction* Car	Engine	*Distance Attn.* Car	Engine	CNEL	Rdwy	Total CNEL	TOW
27.A (no mit)	*0.0*	*120*	*0*	*125*	*0.00*	*5*	*0.0*	0.0	0.0	0.9	0.9	65.6		65.6	0.0
27.A							***5.5***	5.5	5.0	0.9	0.9	60.3		**60.3**	**5.5**
27.A (bldg exp)				*130*		*5*	*5.5*	5.4	5.0	1.1	1.1	60.2		**60.2**	5.5
27.B (no mit)	*0.0*	*135*	*0*	*140*	*0.00*	*5*	*0.0*	0.0	0.0	1.4	1.4	65.1		65.1	0.0
27.B							***5.5***	5.5	5.0	1.4	1.4	**59.8**		**59.8**	**5.5**
27.B (bldg exp)				*145*		*5*	*5.5*	5.4	5.0	1.5	1.5	**59.8**		**59.8**	5.5
28.A (no mit)	*0.0*	*115*	*0*	*120*	*0.00*	*5*	*0.0*	0.0	0.0	0.7	0.7	65.7		65.7	0.0
28.A							***0.0***	0.0	0.0	0.7	0.7	**65.7**		**65.7**	**0.0**
28.A (bldg exp)				*120*		*5*	*0.0*	0.0	0.0	0.7	0.7	**65.7**		**65.7**	0.0
28.B (no mit)	*0.0*	*135*	*0*	*140*	*0.00*	*5*	*0.0*	0.0	0.0	1.4	1.4	65.1	*66.5*	**68.9**	0.0
28.B							***0.0***	0.0	0.0	1.4	1.4	**65.1**	*66.5*	**68.9**	0.0
28.B (bldg exp)				*140*		*5*	*0.0*	0.0	0.0	1.4	1.4	**65.1**	*66.2*	**68.7**	0.0

NEL PREDICTION WORKSHEET - CALVENO
st Update: 7/10/90-fg

The data you need to enter is in *itallics.*

MacTrain - T16042rev12.18.02
4/1/03

Future projections

Roadway Name:	*Curtis Avenue*
Vehicles per day	*6,200*
Speed (mph)	*40*
Grade Adj. (dB)	*0*
hicle Noise Red (dB)	*0*

	Day	Eve	Night	Equiv.
Auto	62.72%	15.90%	9.72%	210.2%
MT	7.58%	1.92%	1.17%	25.4%
HT	0.69%	0.18%	0.11%	2.3%

This is the CNEL at 15 m.

	Soft CNEL(15m)	Hard CNEL(15m)
Auto	62.2	63.4
Medium Trk.	61.9	63.4
Heavy Truck	56.4	57.6
Total	65.6	66.9

To get other noise levels, Put in other distances (ft).

Dist.	Soft	Hard
60	64.3	66.1
100	61.0	63.9
700	48.3	55.4
1340	44.1	52.6

To get other distances, Put in other noise levels.

CNEL	Soft	Hard
57	184	486
60	116	244
65	54	77
70	25	24

Cross Section	Road Elevation	Distance To Wall	Base Of Wall	Dist. To Observer	Pad Elevation	Observer Height	Wall Height	***Barrier Reduction*** Auto	MT	HT	+++CNEL+++ Soft	Hard	++CNEL++ Soft
28.A (no mit)	*0.0*	*40*	*0.0*	*43*	*0.0*	*5*	*0.0*	0.0	0.0	0.0	66.5	~~67.5~~	**66.5**
28.A							***0.0***	0.0	0.0	0.0	66.5	~~67.5~~	**66.5**
28.A (bldg exp)				*45*		*5*	*0.0*	0.0	0.0	0.0	66.2	~~67.3~~	**66.2**
28.B (no mit)	*0.0*	*40*	*0.0*	*43*	*0.0*	*5*	*0.0*	0.0	0.0	0.0	66.5	~~67.5~~	**66.5**
28.B							***0.0***	0.0	0.0	0.0	66.5	~~67.5~~	**66.5**
28.B (bldg exp)				*45*		*5*	*0.0*	0.0	0.0	0.0	66.2	~~67.3~~	**66.2**
31 (no mit)	*0.0*	*40*	*0.0*	*43*	*0.0*	*5*	*0.0*	0.0	0.0	0.0	66.5	~~67.5~~	**66.5**
31							***0.0***	0.0	0.0	0.0	66.5	~~67.5~~	**66.5**
31 (bldg exp)				*45*		*5*	*0.0*	0.0	0.0	0.0	66.2	~~67.3~~	**66.2**
2 (no mit)	*0.0*	*40*	*0.0*	*43*	*0.0*	*5*	*0.0*	0.0	0.0	0.0	66.5	~~67.5~~	**66.5**
2							***0.0***	0.0	0.0	0.0	66.5	~~67.5~~	**66.5**
2 (bldg exp)				*45*		*5*	*0.0*	0.0	0.0	0.0	66.2	~~67.3~~	**66.2**

EL PREDICTION WORKSHEET - CALVENO
st Update: 7/10/90-fg

The data you need to enter is in *italics.*

MacTrain - T16042rev12.18.02
4/1/03

	Future projections
Roadway Name:	*Main Street*
Vehicles per day	*22,000*
Speed (mph)	*50*
Grade Adj. (dB)	*0*
hicle Noise Red (dB)	*0*

	Day	Eve	Night	Equiv.
Auto	73.69%	11.34%	9.45%	204.0%
MT	2.15%	0.33%	0.28%	6.0%
HT	2.15%	0.33%	0.28%	6.0%

This is the CNEL at 15 m.

	Soft CNEL(15m)	Hard CNEL(15m)
Auto	70.3	71.5
Medium Trk.	62.7	64.2
Heavy Truck	66.9	68.1
Total	72.4	73.7

To get other noise levels, Put in other distances (ft).

Dist.	Soft	Hard
400	58.8	64.6

To get other distances, Put in other noise levels.

CNEL	Soft	Hard
57	525	2,283
60	332	1,144
65	154	362
70	71	114